



# CancerCORE

## A New Innovation in Central Cancer Registry Software

*Presented by:*

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*Arkansas Central Cancer Registry*

*NAACCR – Boston 2005*



# History

- ✱ Utilized several applications since 1996
- ✱ Needs became more specific
  - ✱ Prompted the creation of CancerCORE
    - ✱ Allowed for direct control and manipulation
    - ✱ June 2003 was the partial release (abstracting and DCO)
    - ✱ November 2003 – full version released



# Specifications

- ✱ Developed in Visual Basic 6
- ✱ Data are stored on MS SQL Server 2000 databases
- ✱ Database design was purchased from Scotts Hill Assoc.





# CancerCORE Components & Demonstration



# Search Function






- ✱ Use Soundex and NYSIIS to pull alike results
- ✱ Profile database – clean
- ✱ Archive database – data repository/static
- ✱ Suspense database – contains the records that must be reviewed and cleaned before moved to profile.
- ✱ Temporary/outstanding database – holds imported and abstracted data
  - ✱ Accumulated throughout the day and synchronized at night (speeds things up)



# Search Cont.

- ✱ Facility/Physician database – contact information is stored here
- ✱ Non-reportable database – stores cases prior to 1996 or non-reportables
- ✱ Death Clearance database – stores the mortality file and process results
- ✱ Non-hospital reporting database – stores pathology, hospice, nursing home data
- ✱ Facility auditing database
- ✱ Record linkage results database



Name Search <span style="background-color: #800080; color: white; padding: 2px;">Record ID Search</span>		CancerCORE Database Areas (Include in Search)		Selected Database Areas	
Last Name: <input type="text"/>		<b>Cancer Databases</b>		Profile Database	
First Name: <input type="text"/>		<input checked="" type="checkbox"/>  Profile Database			
SSN: <input type="text"/>		<input type="checkbox"/>  Archive Database			
<input type="checkbox"/> Soundex <input type="checkbox"/> NYSIIS		<input type="checkbox"/>  Abstract Databases			
		<input type="checkbox"/>  Suspense Records			
		<input type="checkbox"/>  Outstanding Import Data			
		<b>Supplemental Databases</b>			



# Database Records (Profile)

## ☀ Patient

- demographic and follow-up information

## ☀ Cancer

- lists all cancers for the patient
- Can view all cancers

## ☀ Report

- List of reporting information for a cancer
- Ex.) facilities that submitted and when



# Record Form

- ✱ Many integrity checks reveal conflicts between fields – automatically updates
- ✱ Overall data integrity check – uses edit checks
- ✱ Highlights fields with invalid/suspicious values
- ✱ Everything is selection box oriented and direct entry is allowed
- ✱ Many fields are calculated on 'the fly' i.e.) NHIA, collaborative staging derived codes, beale codes, age of dx



Cancer Database Record: FISHER, RIDDICK (Profile: 652981)

Patient
 Cancer
 Report
 Update Patient Data
 Print Patient Data
 Abstract New Cancer
 Exit
 Help

General
 Residence/Contact/History
 Follow-Up/Vital Status
 System

System Information

Patient ID: 652981  
 Date Patient Created: 4/15/2005  
 Last Change Date: 4/14/2005 11:04:00 PM

Patient Name and Identifiers

First Name: RIDDICK  
 Last Name: FISHER  
 Middle Name:   
 Sex: 1 Male   
 Social Security Number: 999-99-9999  
 Maiden Name:   
 Alias:   
 Name Prefix:   
 Name Suffix:   
 Military Suffix:

Birth Information

Birth Date: 10/06/1973  
 Place of Birth: 999 Unknown

Patient Race/Ethnicity

Race: 01 White   
 Extended Race 2: 88 No Further Race Documented   
 Extended Race 3: 88 No Further Race Documented   
 Extended Race 4: 88 No Further Race Documented   
 Extended Race 5: 88 No Further Race Documented

Spanish/Hispanic Origin

Spanish Origin: 9 Unknown   
 NHIA: 0 Non-spanish; Non-hispanic



Cancer Database Record: FISHER, RIDDICK (Profile: 652981)

Patient
 Cancer
 Report
 Update Cancer Data
 Print Cancer Data
 Abstract New Cancer
 Exit
 Help

Login Date	Primary Site	DX Date	Morphology
04/15/2005	C008	01/01/2000	8000/3

System Information

Cancer ID: 652981  
 Date Cancer Created: 4/15/2005  
 Last Change Date: 4/14/2005 11:04:00 PM  
 System Void Flag: Reportable/Valid Case

Reporting Information

Archive FIN: 710400 Saint Vincent Infirmary Medical C  
 First Contact Date: / /  
 Reporting Source: 1 Hospital Or Clinic  
 Casefinding Source: 10 Reporting Hospital, Nos  
 Abstractor: CJF

Diagnosis

**Diagnosis**  
 Date of Diagnosis: 01/01/2000  
 Primary Site: C008 Overlapping Lesion Of Lip  
 SEER Site Group: 20010 Lip  
 Histology (ICD-O 2): 8000 Neoplasm, malignant  
 Behavior (ICD-O 2): 3 Malignant  
 Histology (ICD-O 3): 8000 Neoplasm, malignant  
 Behavior (ICD-O 3): 3 Malignant  
 Grade: 4 Grade Iv; Undifferentiated, Anaplastic  
 Laterality: 0 Not A Paired Site  
 Sequence Number: N/A

Miscellaneous

Age at Diagnosis: 026  
 Marital Status at DX: 9 Unknown  
 Physician Managing: 999999 Unknown Physician  
 Cancer Status: 9 Unknown  
 Diagnostic Confirmation: 9 Unknown



Cancer Database Record: FISHER, RIDDICK (Profile: 652981)

Patient Cancer Report 
 Update Report Data 
 Open Associated Archive 
 Print Report Data 
 Abstract New Report 
 Exit 
 Help

Login Date	Facility	Accession #	Abstractor
04/15/2005	710400	?????????	CJF

Reporting

Facility Surgery/Treatment

Data Transmission

NAACCR Record Version: B 2006 Version 11  
 Transmit Date: 04/23/2005  
 Record Type: A Full Case Abstract Record Type  
 Vendor: CCORE1.0  
 Date Case Received: 04/23/2005  
 Date Case Loaded: 04/23/2005

System Information

Report ID: 652981  
 Date Report Created: 4/15/2005  
 Last Change Date: 4/14/2005 11:04:00 PM

Facility Information/Referrals

Reporting Facility: 710400 Saint Vincent Infirmary Medical C   
 Registry ID: 000000710 Arkansas Central Cancer Registry   
 Registry Type: 1 Central Registry (population-based)   
 Facility Referred From: N/A  
 Facility Referred To: N/A  
 Class of Case: 0 Dx At Rep. Facility, All 1st Course Rx El   
 Primary Payer: 99 Unknown

Case Information

Facility Patient ID:  
 Medical Record Number: UNK  
 Tumor Record Number:  
 Date Tumor Rec Available: / /  
 Accession Number:  
 Sequence Number: N/A  
 Abstractor: CJF  
 Report Source: 1 Hospital Or Clinic  
 Date Case Completed: 04/23/2005



# Abstracting

- ✱ Data entry form with selection boxes and code searching functions
- ✱ On-line integrity check
  - Conflicts between fields
- ✱ Interactive fields i.e.) no surgery of primary site performed...application will update all other surgery related fields (surgical margins, reg/distant surg summ, lymph node surg summ)



# Abstracting Cont.

- ★ Three primary areas (patient, cancer, report)
- ★ Full abstracts not required if pt. already exists; can abstract cancer portion only
- ★ Performs data integrity checks – runs EDITs before saving...cannot be saved before cleaned!



Abstract New Record (MURPHY, DALE L: 999-88-7777)

P  
A  
T  
I  
E  
N  
T  
  
D  
A  
T  
A

Last Name: MURPHY

First Name: DALE

Middle Name: L

Name Suffix:

Maiden Name:

Alias:

Birth Date: 01/10/1954

Social Security No: 999-88-7777

Sex: 1 - Male

Race: 01 - White

Spanish Origin: 9 - Unknown

Telephone Number: (999) 999-9999

Family History: 9 - Unknown

Alcohol History: 9 - Unknown

Tobacco History: 9 - Unknown

Occupation Text: UNKNOWN

Industry Text: UNKNOWN

State of Residence: AR - Arkansas

Street Address: 35 MATTHEWS LN

Navigation

< Back

Next >

Outstanding

Field Legend

Required Fields

Not Required

Optional Fields

High Importance  
Optional Fields

Save Options

Outstanding

Abstract DB

Help

Exit



Sequence Number:	00 - One primary in the patient's lifetime	00
Diagnosis Date:	01/01/2004	
Primary Site:	C000 - External upper lip	
Morphology ICD-O 3:	8270/3	Chromophobe carcinoma (C75.1)
Laterality:	0 - Not a Paired Site	
Grade:	1 - Grade I; Well Differentiated	
Report Source:	1 - Hospital or Clinic	
Physician Managing:	999999	Unknown Physician
Cancer Status:	9 - Unknown	
Diagnostic Conf:	9 - Unknown	
Admission Date:	99/99/9999	
Date of 1st Biopsy:	99/99/9999	
Casefinding Source:	10 - Reporting Hospital, NOS	
State at Diagnosis:	AR - Arkansas	
Address at Diagnosis:	35 WITMORE AVE	
Supplemental Addr:	UNKNOWN	
City at Diagnosis:	CABOT - LONOKE COUNTY	
County at Diagnosis:	085 - Lonoke County	
Zip Code at Diagnosis:	99999-9999	

**Navigation**

< Back Next >

**Outstanding**

**Field Legend**

- Required Fields
- Not Required
- Optional Fields
- High Importance Optional Fields

**Save Options**

 **Outstanding**

 **Abstract DB**

 **Help**

 **Exit**





# Quality Assurance (QA)



Quality Assurance

Primary QA Tasks

**Patient De-Duplication**

- No Outstanding Duplicates to Resolve
- 0 User(s) Currently Processing

**Cancer De-Duplication**

- There are Outstanding Duplicates to Resolve
- 0 User(s) Currently Processing

**Review Suspense Records**

- 121 Record(s) Need to be Reviewed
- 0 User(s) Currently Processing

**City/County Reconciler**

- No Reconciliation is Taking Place

Other QA Tasks

**CancerCORE Data Integrity Checker**

Help

Refresh

Exit



# Merging

- ✱ Algorithms for patient and cancer de-duplication
- ✱ Calculates match scores and reports to user the records to resolve
- ✱ Merging provides a side-by-side view of the main and the matching records
- ✱ Data integrity checks
- ✱ Users can copy information from match field to main field (via arrow button)



# Merging Cont.

- ✱ Facility and contact information is displayed for user
- ✱ Fields with discrepancies are highlighted for easy identification
  - ✱ Optional function to show only discrepancies
- ✱ Keeps a log of all records that have been designated as not duplicates so they are not pulled for future reconciliation



Cancer Visual Edits and Merging - De-Duplication ( )

Exit True Match (Merge) Resolved Cancers Normal Record View Static Item Discrepancy Invalid Value

**Field Name**

**Primary Record**

**Match Record**

Cancer Case ID: 603663

Cancer Login Date: 7/6/2004 3:56:00 PM

Last Change Date: 11/29/2004 7:46:00 AM

Date of Diagnosis: 01/24/2003

Primary Site: C530 Endocervix

Histology ICD-O 2: N/A

Behavior ICD-O 2: N/A

Histology ICD-O 3: 8380 Endometrioid adenocarcinoma, NOS

Behavior ICD-O 3: 3 Malignant

Grade: 2 Grade II; Moderately Differentiated

Laterality: 0 Not A Paired Site

Sequence Number: 02 2 Of Two Or More Primaries Or Non-malignant Tumors

Reporting Source: 1 Hospital Or Clinic

Casefinding Source: N/A

Date of First Contact: 01/24/2003

Abstractor: WD



648075

1/5/2005 8:53:00 AM

10/29/2004

01/24/2003

C559 Uterus, Nos

N/A

N/A

8383 Endometrioid adenocarcinoma, ciliated cell variant

3 Malignant

1 Grade I; Well Differentiated

0 Not A Paired Site

02 2 Of Two Or More Primaries Or Non-malignant Tumors

1 Hospital Or Clinic

N/A

01/24/2003

RW



Reporting Facilities:

Facility	Date Last Sent	Facility Name
710440	07/06/2004	University of Arkansas F
710563	08/24/2004	White County Medical C

Facility	Date Last Sent	Facility Name
710563	01/05/2005	White County Medical C





## Quality Assurance

### CancerCORE Data Integrity Checker

Integrity Checks:

Run	Multi-Field	Source	Check Name
<input type="checkbox"/>	No	NAACCR	Addr at DX--State
<input type="checkbox"/>	No	CoC	Birthplace
<input type="checkbox"/>	No	SEER	Race 2
<input type="checkbox"/>	No	SEER	Race 3
<input type="checkbox"/>	No	SEER	Race 4
<input type="checkbox"/>	No	SEER	Race 5
<input type="checkbox"/>	No	SEER	Sex
<input type="checkbox"/>	No	SEER	Spanish/Hispanic Origin
<input type="checkbox"/>	No	NAACCR	Summary Stage
<input type="checkbox"/>	No	SEER	Behavior

#### Outstanding Integrity Checker Results

Run Date: 5/3/2005 11:15:00 PM

Passed: 1,022,845

Failed: 383


Skipped: 1,488

Resolved: 2

Remaining: 381

 **Run Checker**

 **Resolve**

 **Select All**

 **Select None**

The integrity checker will run a number of interfield checks to valid field values. Those fields that fail are marked to be resolved by the user.

The user has the ability to select which checks to run using the integrity check list.

 **Main Menu**

 **Help**

 **Refresh**

 **Exit**



## Quality Assurance

### Failed CancerCORE Data Integrity Checks to Resolve

#### Record Information

Patient ID: 63465

Item Number: 2

Patient Name: \_\_\_\_\_

Total Items: 235

SSN: \_\_\_\_\_

Checks Failed: 2

 Next Record

 Open Record

 Resolved

Case ID: 200584  
Check Name: Histologic Type (COC)  
Fields: Histology ICD-O 2 (2600)  
Description: Not a valid value for histology ICD-O 2.

Case ID: 200584  
Check Name: Histologic Type ICD03 (COC)  
Fields: Histology ICD-O 3 (2600)  
Description: Not a valid value for histology ICD-O 3.

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 Main Menu

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# Facility Auditing Tool

- ✱ Provides users a way of organizing, scheduling and performing QA (reabstracting) and case-finding audits
- ✱ Work flow chart to better understand how the audit process works for a particular audit.
- ✱ Calendar available for scheduling audits



# Case-finding Audit

- ★ System will take records to cross match with the database
  - ✱ Determines what was/was not reported
  - ✱ User receives report for follow-up
- ★ Reports are generated with the final results
  - ✱ These are provided to audited facility



# QA (Reabstracting) Audit

- ✱ System automatically generates random list of records to reabstract
- ✱ Option of blinded or non-blinded audit
- ✱ System highlights discrepancies (minor or major) as data are entered
- ✱ Upon reconciliation, user can select reasoning for the discrepancy (i.e. abstractor error, auditor error)
- ✱ Detailed summary report is generated
  - ✱ # of discrepancies, type, overall accuracy %





## Audit Schedule

Schedule and view upcoming or previous casefinding and reabstracting audits.



## Casefinding Audit

Population-based central cancer registries are mandated to collect data on cancer and other reportable tumors for residents of the geographic area. The central cancer registry must verify that all reportable tumors diagnosed in their residents are included in the central registry database. One process used to monitor case completeness for the registry and for individual reporting facilities is a casefinding audit. A casefinding audit examines casefinding procedures and evaluates completeness of case ascertainment. The casefinding audit may be performed to evaluate completeness of case ascertainment for an individual reporting facility, or it may be performed to evaluate completeness of case ascertainment for the central cancer registry.\*



## Reabstracting (QA) Audit

Population-based central cancer registries are mandated to collect data on cancer and other reportable tumors for residents of their geographic area. For the data to be useful in research, the information must be accurate and consistent. Reabstracting audits are performed to evaluate the accuracy and validity of submitted data.\*



## Exit Facility Auditing Tool

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\* Disk 6 of *Fundamentals of Registry Operations. Audits: Casefinding and Reabstracting* (NAACCR - North American Association of Central Cancer Registries, NPCR - National Program of Cancer Registries, CDC - Centers for Disease Control and Prevention, U.S. Department of Health and Human Services)





# Audit Schedule

Main Menu

Exit

June 2005

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		




July 2005

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						





August 2005

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

 Past Audit

 Upcoming Audit

 Holiday/Office Closed

 Past/Current Date

## Upcoming Audits:

Facility Name	Facility No.	Audit Date	Audit Type	Status	

List All Audits

List Upcoming Audits

Schedule Audit

Open Audit





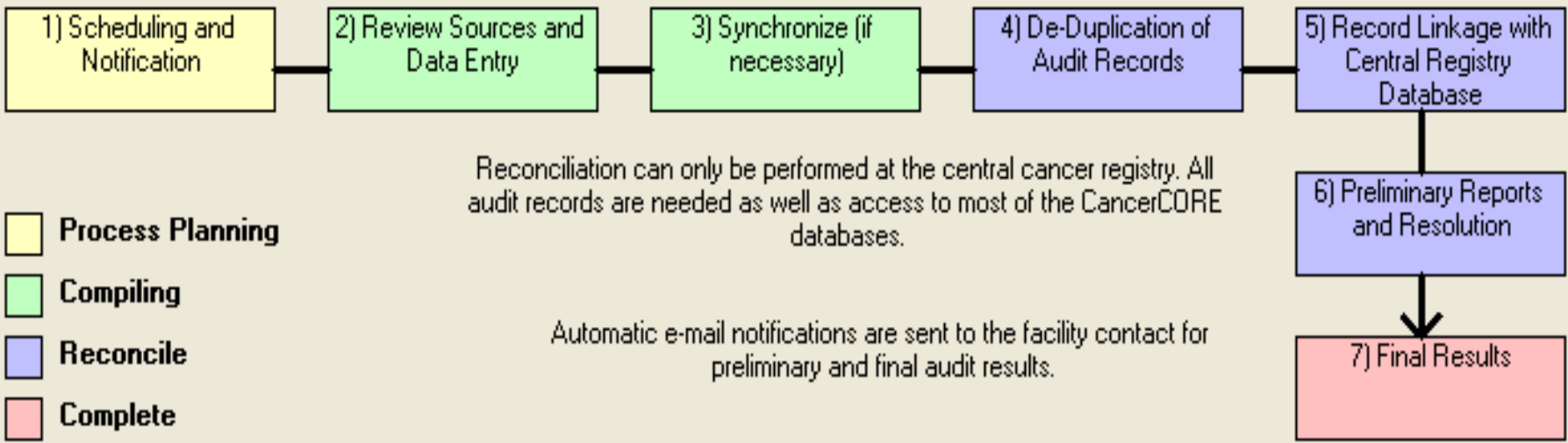
# Casefinding Audit

Main Menu

Exit

Scheduling and notification of the facility to be audited is necessary to ensure a smooth process with as little inconvenience to the facility as possible.

Data entry should be conducted at the facility from original sources. Records will have to be synchronized from the laptops to continue the audit process.



## All Casefinding Audits:

Facility Name	Facility No.	Audit Date	Audit Type	Status	

List All Audits

List Upcoming Audits

Open Audit



# Death Clearance

- ✱ Interactive flow chart for processing
- ✱ Once a process is completed it is marked and the next process becomes available
- ✱ DC can be performed on more than one death certificate year at a time
- ✱ Can search and view all death certificates
- ✱ Record linkage performed between profile database and death certificates
  - ✱ List of records to be reconciled as matches or non-matches is generated



# Death Clearance Cont.

- ★ Once reconciliation is complete, all true matches are automatically updated with vital status information and those fields that are unknown in the database with those on the death certificate i.e.) ss #, occupation text
- ★ Linkages between false matches that are cancer deaths are performed with the non-reportable, non-hospital and archive databases to lower burden of follow-back
  - ★ Remaining records are linked with discharge summaries to provide additional information to improve follow-back.



# Death Clearance Cont.

- ✱ Follow-back processing provides a system to flag records as contacted
- ✱ User can mark records as DCO, MDO or discovered true match
- ✱ System automatically abstracts those DCO's based on the death certificate.

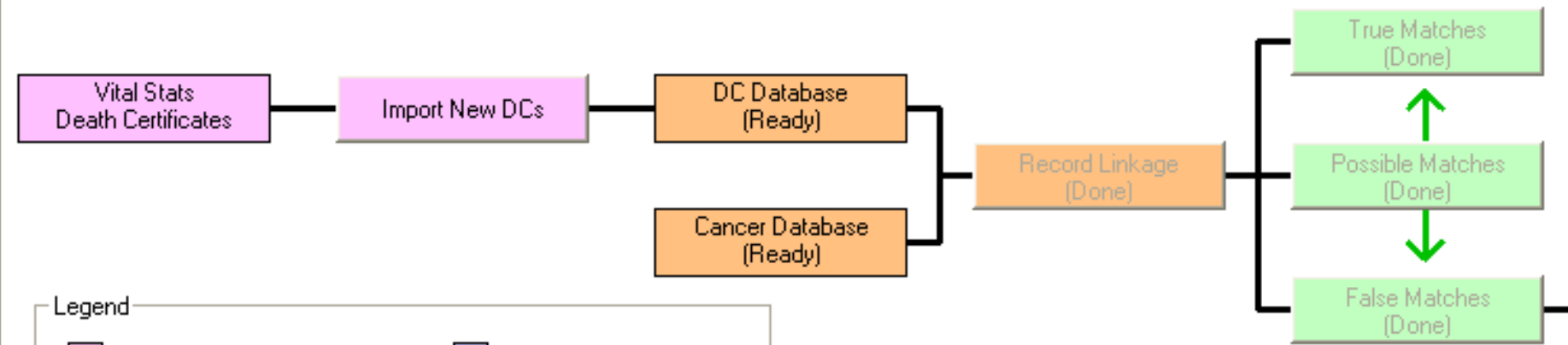


## Death Clearance (PORTED AND STRIPPED TEMPORARY VERSION)

Select Process Year:  Search Death Certificate DB

Death certificates must be received from Vital Stats. The death certificates can then be imported into the CancerCORE death certificate database. This database contains all certificates that have been imported in the past and can be searched but not modified..

Once the death certificates for the process year have been imported the record linkage with the profile database can be performed.



### Legend

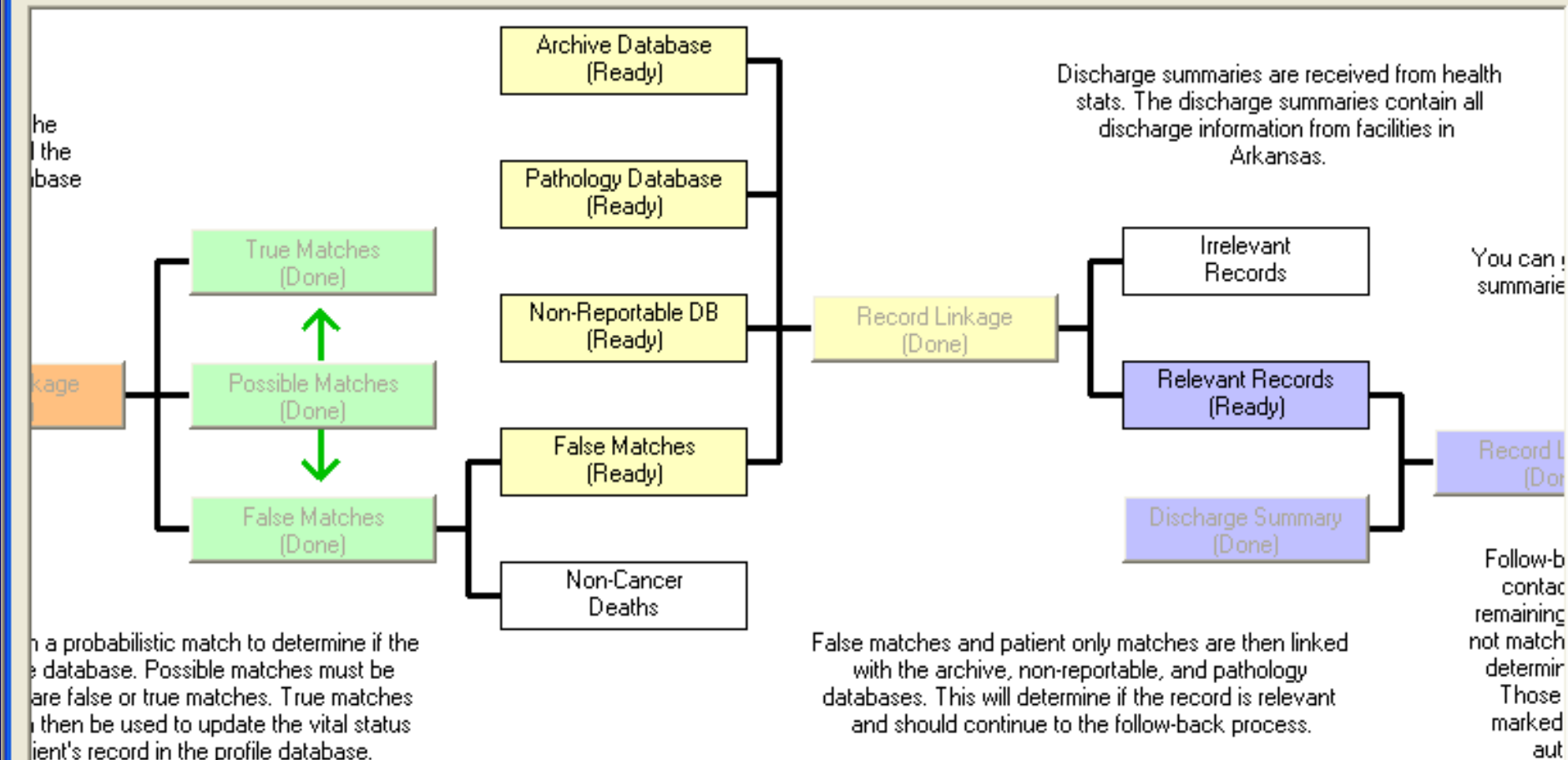
- |   |  |
|---|--|
| <span style="display: inline-block; width: 15px; height: 15px; background-color: pink; border: 1px solid black;"></span> Death Certificates         | <span style="display: inline-block; width: 15px; height: 15px; background-color: lightblue; border: 1px solid black;"></span> Record Linkage Information |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: orange; border: 1px solid black;"></span> Record Linkage Cancer DB | <span style="display: inline-block; width: 15px; height: 15px; background-color: white; border: 1px solid black;"></span> Irrelevant Data                |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: lightgreen; border: 1px solid black;"></span> Follow-Up            | <span style="display: inline-block; width: 15px; height: 15px; background-color: pink; border: 1px solid black;"></span> Follow-Back                     |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: yellow; border: 1px solid black;"></span> Record Linkage Relevance |  |

The record linkage will perform a probabilistic match to determine if the deceased exist in the profile database. Possible matches must be reviewed to determine if they are false or true matches. True matches and patient-only matches can then be used to update the vital status information within the patient's record in the profile database.



## Death Clearance (PORTED AND STRIPPED TEMPORARY VERSION)

Select Process Year: 2001 Search Death Certificate DB Refresh Exit

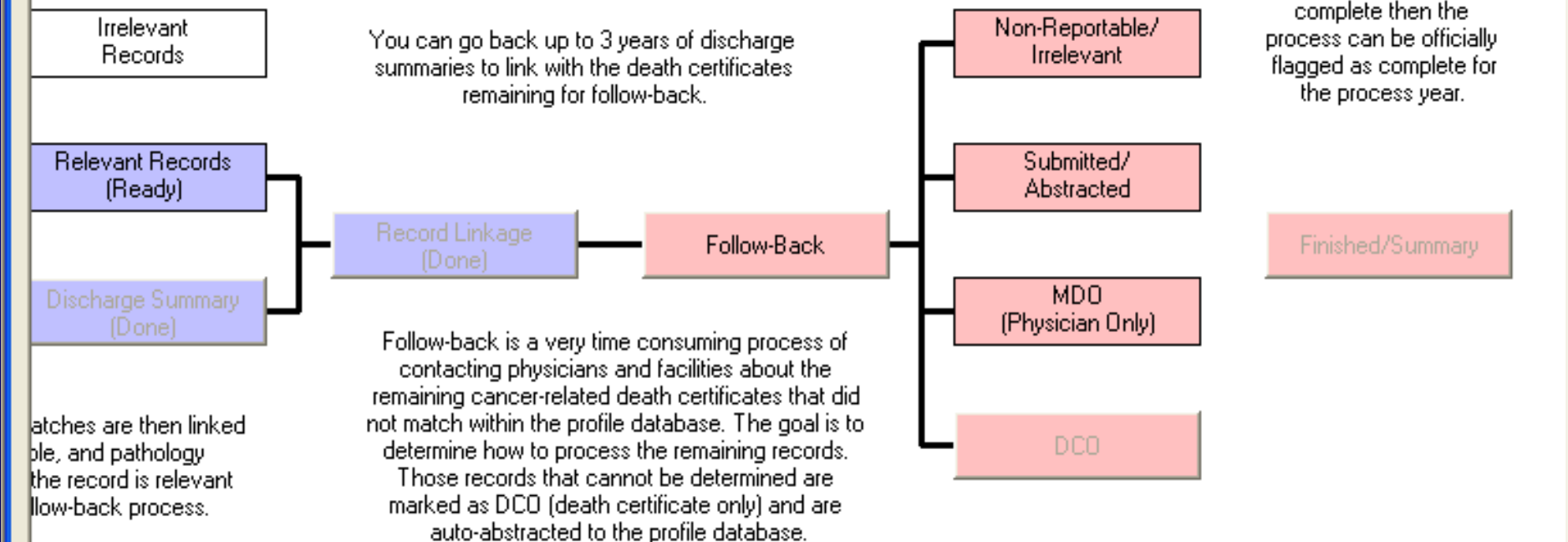




Death Clearance (PORTED AND STRIPPED TEMPORARY VERSION)

Select Process Year: 2001 Search Death Certificate DB Refresh Exit

ge summaries are received from health  
The discharge summaries contain all  
charge information from facilities in  
Arkansas.



atches are then linked  
ple, and pathology  
the record is relevant  
low-back process.



# Record Linkage Utility

- ✱ Links external data with any of the databases
- ✱ Linkage wizard provides choices of databases to link with
- ✱ Utility accepts many types of file formats i.e.) ASCII, Access, Excel



# Analysis

- ✱ Query on Profile database or Static file
- ✱ Numerous selection criteria
- ✱ User defined queries
- ✱ Canned reports i.e.) case counts by facility/year, errata report for facilities, accession report
- ✱ Results are displayed in detailed summary reports that can be sorted, exported, and mapped



☒ Profile    ☐ Static

Database Areas:    ☒ Patient    ☒ Cancer    ☐ Text    ☐ Report

Patient	Cancer
Field Name	Description
<input type="checkbox"/> *	All Fields
<input type="checkbox"/> PatientCaseld	Patient ID (Primary Key)
<input type="checkbox"/> PatientLoginD...	Patient Login Date
<input type="checkbox"/> LASTCHANG...	Last Change Date
<input type="checkbox"/> Comment	Comments
<input checked="" type="checkbox"/> LASTNAME	Last Name

**Patient Criteria:**

☐ Sex:


☐ Race:


---


**Cancer Criteria:**


☐ Arkansas Cases Only    ☐ Invasive Cases Only


Field	Table	Sort	Group By	Criteria
LASTNAME	PATIENT			=N'fisher'

    Field:

    Table:

    Sort:

    Group By:

    Function:

Operand:

Value:

```
(PATIENT.LASTNAME =N'fisher')
```



# Future Plans

- ✱ Redeveloping application in VB Net
- ✱ Allow users in field access to the database from any location
- ✱ Annual report generating module
- ✱ Cluster tracking system
- ✱ Enhanced GIS integrated utility
- ✱ Additional management reports



# Acknowledgements

- ✱ Ken Hill of Scotts Hill Associates
- ✱ Eric Durbin of KCR
- ✱ NAACCR for the death clearance and facility auditing procedures (Registry Fundamental CD's)
- ✱ CDC/NPCR



The background of the slide features a dark blue field filled with several interlocking gears of varying sizes and shades of blue. On the far left, there is a vertical strip with a colorful, abstract, and pixelated texture in shades of orange, yellow, and brown.

Thank You